

Table 1. Demographic characteristics of the study population	
Age (years)	65.0 ± 10.0
Gender	
Male	50 (50.0%)
Female	50 (50.0%)
Education (years)	12.0 ± 2.0
Marital status	
Married	40 (80.0%)
Single	10 (20.0%)
Occupation	
Retired	30 (60.0%)
Unemployed	20 (40.0%)
Income (USD/month)	1000.0 ± 500.0
Health status	
Good	30 (60.0%)
Poor	20 (40.0%)
Comorbidities	
Hypertension	15 (30.0%)
Diabetes	10 (20.0%)
Cholesterol	12 (24.0%)
Smoking status	
Smoker	10 (20.0%)
Non-smoker	40 (80.0%)
Alcohol consumption	
Regular	5 (10.0%)
Occasional	15 (30.0%)
Never	30 (60.0%)

turning off the engine when said first set  
of conditions is not present and when the engine has

been in a current vehicle idle mode for a predetermined amount of time.

2. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when a state of charge of a battery is below a predetermined battery minimum state of charge.

3. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle

system controller to control said generator to  
schedule a desired engine speed to produce a first  
desired effect when a vacuum level in a climate  
control reservoir is below a predetermined minimum  
5 climate control vacuum level.

4. The method of claim 1, wherein the  
step of scheduling a desired engine brake torque and  
selectively activating a vehicle system controller to  
control said generator to schedule a desired engine  
10 speed and producing a first desired effect when a  
first set of operating conditions is present  
comprises the step of scheduling a desired engine  
brake torque and selectively activating a vehicle  
system controller to control said generator to  
15 schedule a desired engine speed to produce a first  
desired effect when a vacuum level in a brake system  
reservoir is below a predetermined brake system  
vacuum level.

5. The method of claim 1, wherein the  
20 step of scheduling a desired engine brake torque and  
selectively activating a vehicle system controller to  
control said generator to schedule a desired engine  
speed and producing a first desired effect when a

first set of operating conditions is present  
comprises the step of scheduling a desired engine  
brake torque and selectively activating a vehicle  
system controller to control said generator to  
5 schedule a desired engine speed to produce a first  
desired effect when a vacuum level in a powertrain  
vacuum mount reservoir is below a predetermined  
minimum powertrain mount vacuum level.

6. The method of claim 1, wherein the  
10 step of scheduling a desired engine brake torque and  
selectively activating a vehicle system controller to  
control said generator to schedule a desired engine  
speed and producing a first desired effect when a  
first set of operating conditions is present  
15 comprises the step of scheduling a desired engine  
brake torque and selectively activating a vehicle  
system controller to control said generator to  
schedule a desired engine speed to produce a first  
desired effect when a vapor canister contained within  
20 a fuel system requires purging.

7. The method of claim 1, wherein the  
step of scheduling a desired engine brake torque and  
selectively activating a vehicle system controller to

control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine  
5 brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when an adaptive fuel table requires HEV-fast adaptive learning.

10               8.     The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a  
15 first set of operating conditions is present comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first  
20 desired effect when the engine has cooled below a predetermined engine temperature.

9.     The method of claim 1, wherein the step of scheduling a desired engine brake torque and

selectively activating a vehicle system controller to  
control said generator to schedule a desired engine  
speed and producing a first desired effect when a  
first set of operating conditions is present  
5 comprises the step of scheduling a desired engine  
brake torque and selectively activating a vehicle  
system controller to control said generator to  
schedule a desired engine speed to produce a first  
desired effect when a catalyst has cooled below a  
10 predetermined minimum catalyst temperature.

10. The method of claim 1, wherein the  
step of scheduling a desired engine brake torque and  
selectively activating a vehicle system controller to  
control said generator to schedule a desired engine  
15 speed and producing a first desired effect when a  
first set of operating conditions is present  
comprises the step of scheduling a desired engine  
brake torque and selectively activating a vehicle  
system controller to control said generator to  
20 schedule a desired engine speed to produce a first  
desired effect when air conditioning has been  
requested by a vehicle operator.

11. The method of claim 1, wherein the step of selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present comprises the step of  
5 selectively activating an engine controller to control engine idle speed when:

the generator has failed; or

a battery state of charge exceeds a maximum desired level.

10 12. A hybrid electric vehicle including a generator having a rotor assembly which is operatively coupled to an engine, the hybrid electric vehicle comprising:

a vehicle system controller for controlling  
15 the idle speed of the engine when a first set of operating conditions is present at a scheduled engine brake torque to produce a desired result; and

an engine controller for controlling the idle speed of the engine when a second set of  
20 operating conditions is present.

13. The method according to claim 11, wherein said first set of operating conditions is selected from a group consisting of a low battery

state of charge, a low climate control vacuum level,  
a low brake system reservoir vacuum level, a low  
powertrain mount vacuum level, a high fuel tank vapor  
pressure requiring fuel vapor canister purging, a  
5 condition where the fuel vapor canister is currently  
being purged, a minimum time reached since previously  
purging the vapor canister, a low engine temperature,  
a low catalyst temperature, an adaptive fuel table  
requiring HEV-fast adaptive learning, and an  
10 activated air conditioning switch.

14. The hybrid electric vehicle of claim  
12, wherein said second set of operating conditions  
is selected from a group consisting of a high battery  
state of charge and a failed generator.

15 15. A method for controlling the idle  
speed of an engine within a hybrid electric vehicle  
including a generator having a rotor assembly which  
is operatively coupled to an engine, said method  
comprising the steps of:

20 determining whether a first set of vehicle  
idle entry conditions are met, wherein said first set  
of vehicle idle entry conditions comprises whether  
the vehicle is below a predetermined maximum idle



speed and whether an accelerator pedal is below a predetermined minimum pedal position;

5 scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and produce a first desired effect when a first set of operating conditions is present, wherein said first set of operating conditions is selected from the group consisting of a  
10 low battery state of charge, a low climate control vacuum level, a low brake system reservoir vacuum level, a low powertrain mount vacuum level, a high fuel tank pressure, the existence of a minimum time period since a last vapor canister purging, the  
15 existence of current vapor canister purging, the existence of a learned adaptive fuel table for the current driving mode, a low engine temperature, a low catalyst temperature, and the state of activation of an air conditioning switch;

20 selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present;

turning off the engine when said first set of conditions is not present and when the engine has

been in a current vehicle idle mode for a predetermined amount of time, otherwise maintaining said current vehicle idle mode.

16. The method of claim 15, wherein the  
5 step of selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present comprises the step of selectively activating an engine controller to control engine idle speed when:

10 the generator has failed; or

a battery state of charge exceeds a maximum desired level.